Interoperability, Technology, and Transformation

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Overview

- **Transformation: Capabilities-Based Approach**
- **S&T Investment and Transformation**
- **Technology Transition and Interoperability**
- **National Security Workforce**

Definition of Transformation

“The Evolution and Deployment of Combat Capabilities That Provide Revolutionary or Asymmetric Advantages to Our Forces”

- QDR (Sep 30, 2001)

QDR Critical Capabilities

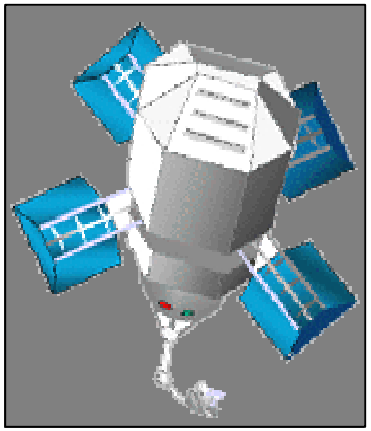
- **Protect Bases of Operations**
- **Conduct Information Operations**
- **Project and Sustain US Forces**
- **Deny Enemy Sanctuary**
- **Conduct Space Operations**
- **Leverage Information Technologies**

Protecting Bases of Operations

- ***Combating Terrorism***
- ***Chemical/Biological Defense***
- ***Missile Defense***
- ***Consequence Management***

Conduct Information Operations

- ***Defensive IO and Information Assurance***
- ***Offensive IO***



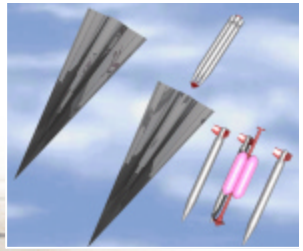
Project and Sustain US Forces

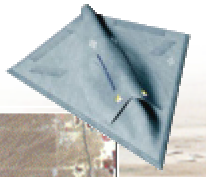
- ***Anti-Access Capabilities***

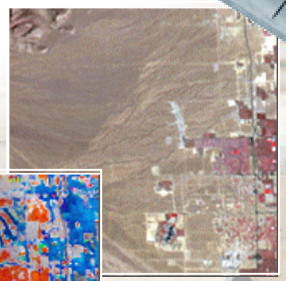
Deny Enemy Sanctuary

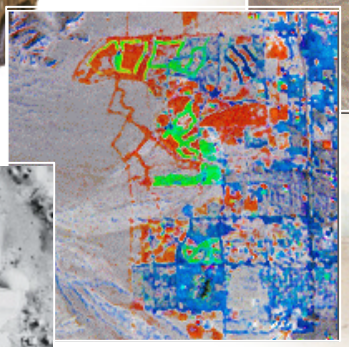
Persistent Surveillance, Tracking and Rapid Engagement with Precision Strike

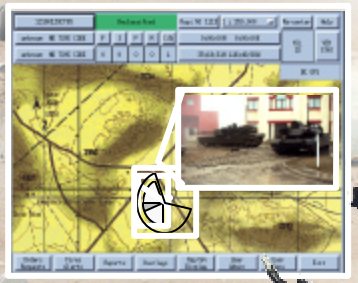
- ***Remote Sensing/Enhanced C4ISR***
- ***Unmanned Aerial Vehicle***
- ***Long-Range Precision Strike***
- ***Small-Diameter Munitions***
- ***Defeat Hard and Deeply Buried Targets***





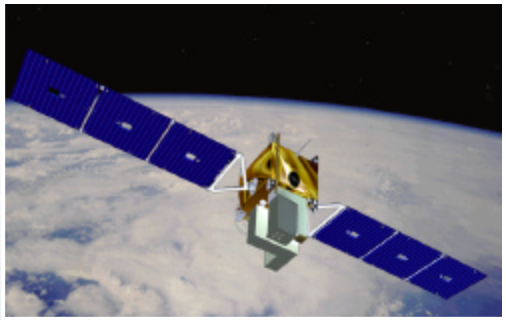


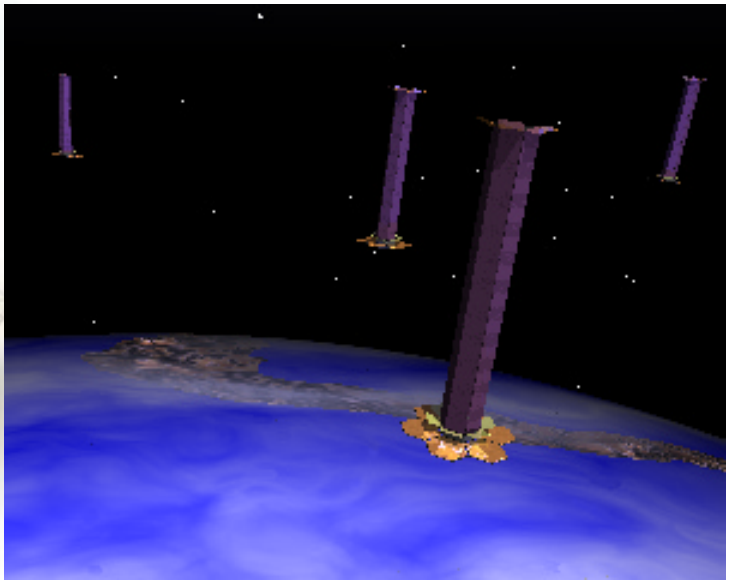




Conduct Space Operations

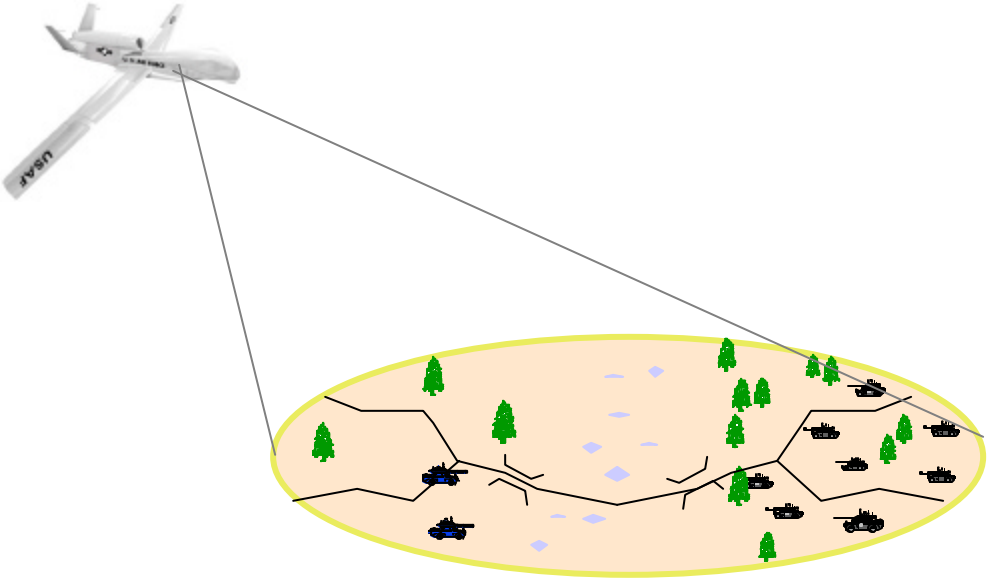
- ***Ensure Access to Space***
- ***Protect Space Assets***
- ***Space Surveillance***
- ***Control Space***
- ***Sub-Orbital Space Vehicle***

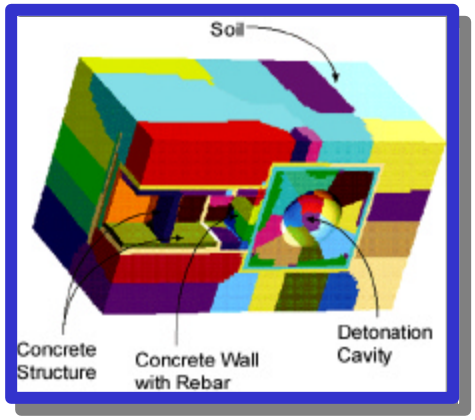




Leverage Information Technologies

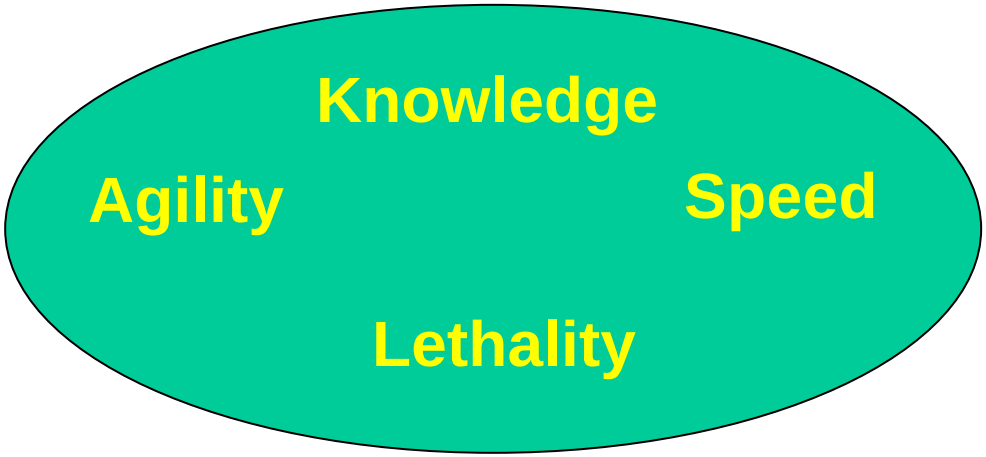
- ***High-capacity Interoperable Communications***
- ***Survivable, Improved, Tactical and Strategic Communications***
- ***End-to-end C4ISR***





Technology and Transformation

- **Transformation Attributes**



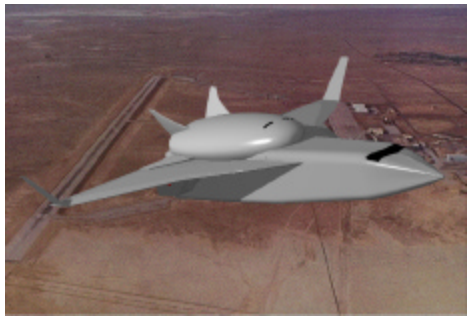
- **Transformation Technology Initiatives**
  - **National Aerospace Initiative**
  - **Surveillance and Knowledge Systems**
  - **Energy and Power Technologies**

National Aerospace Initiative
- *Strategic and Tactical Framework*

- **Hypersonics**
  - **Strategic Strike, Time Critical Targets, Suborbital Vehicles, UCAVs, Fast Transportation, etc.**
- **Access to Space**
  - **TSTO: 1st - Air Breathing, 2nd - Rocket; SSTO**
- **Advanced Space Technologies**
  - **Microsats, Multifunction Satellites, etc.**

National Aerospace Initiative
- *Approach*

Space Access



Weapons

RLV (Affordable, timely access to space)

Hypersonic Cruiser (Global Reach/Attack)

Far-Term

Supersonic/Hypersonic Missiles (Time-critical targets)

Mid-Term

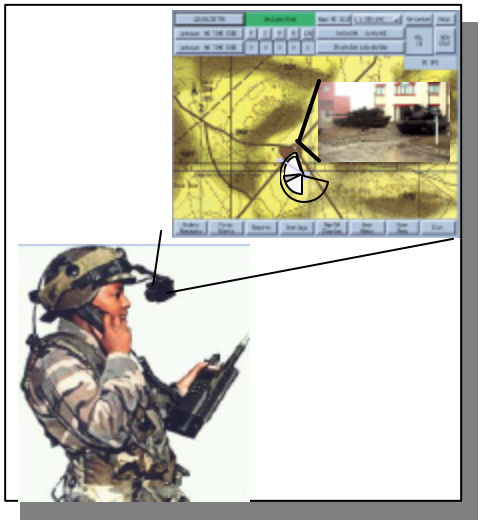
Near-Term

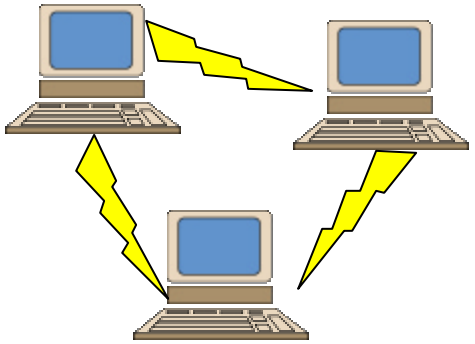
Pursue Stepping-Stone Approach

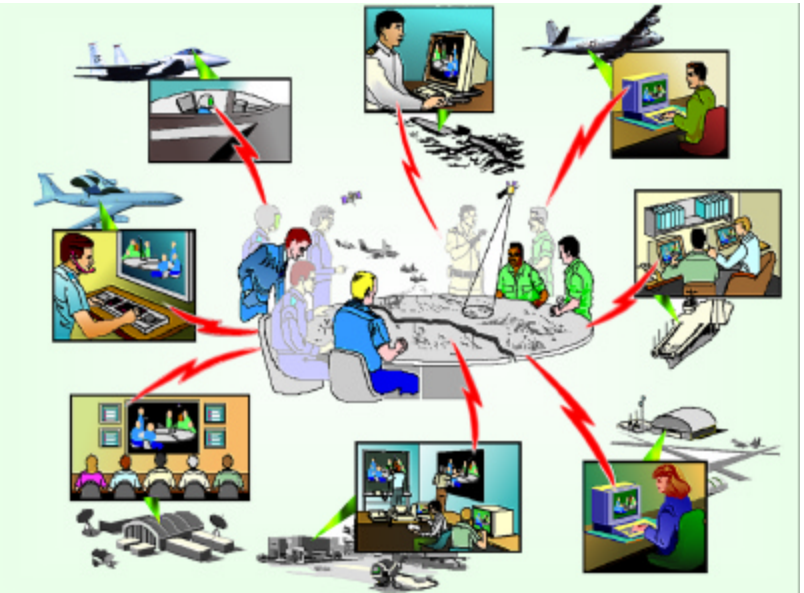
Surveillance & Knowledge Systems - *C4ISR*

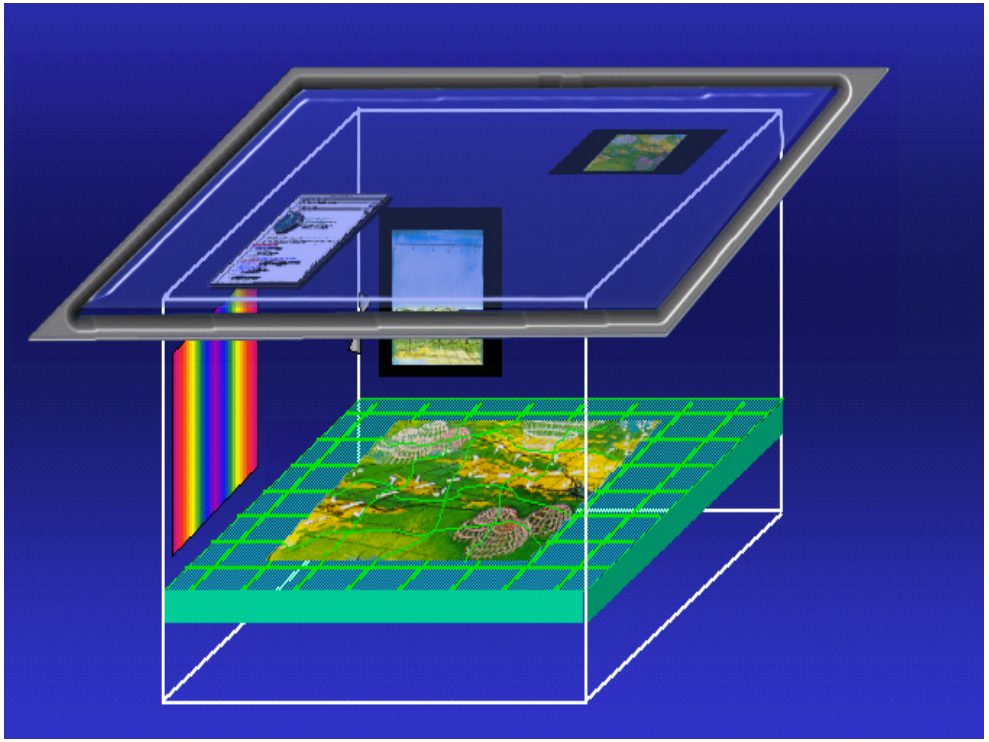
- **Sensors and Unmanned Vehicles**
  - **Bio Sensors, Robotics, UAVs, etc.**
- **High Bandwidth Communications / Information Assurance**
- **Information / Knowledge Management Systems**
- **Cyber Warfare**

Surveillance & Knowledge Systems









Energy and Power Technologies
- Enabling An "Electric" Force

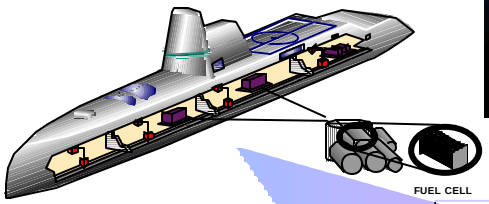
- **Power Generation**
  - **Nuclear, Diesel, Jet Engine, Solar Array, Fuel Cells, etc.**
- **Energy Storage**
  - **Batteries, Fly Wheels, Capacitors, Energetics, etc.**
- **Power Management and Control**
  - **Energy Conversion, Catapults, etc.**
- **Directed Energy Weapons**
  - **Lasers, Microwave, Millimeter Wave, etc.**

Energy and Power Technologies

POWER GENERATION
- Fuel Cells & Fuel Reforming
- Novel Power

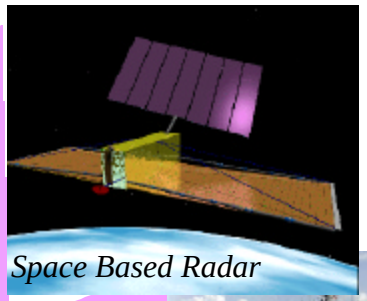
ENERGY STORAGE
- Batteries
- Capacitors

POWER MANAGEMENT & CONTROL
- Switching & Conditioning
- Power Transmission & Distribution
- Thermal Management



Electric Warship

More Electric Aircraft

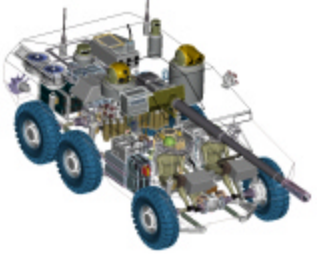


Space Based Radar

Electric Warship

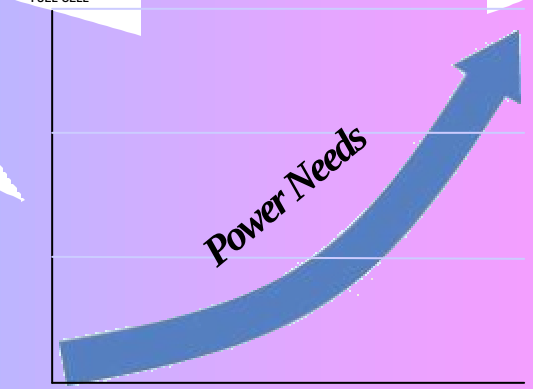
Warrior

High Power Microwave



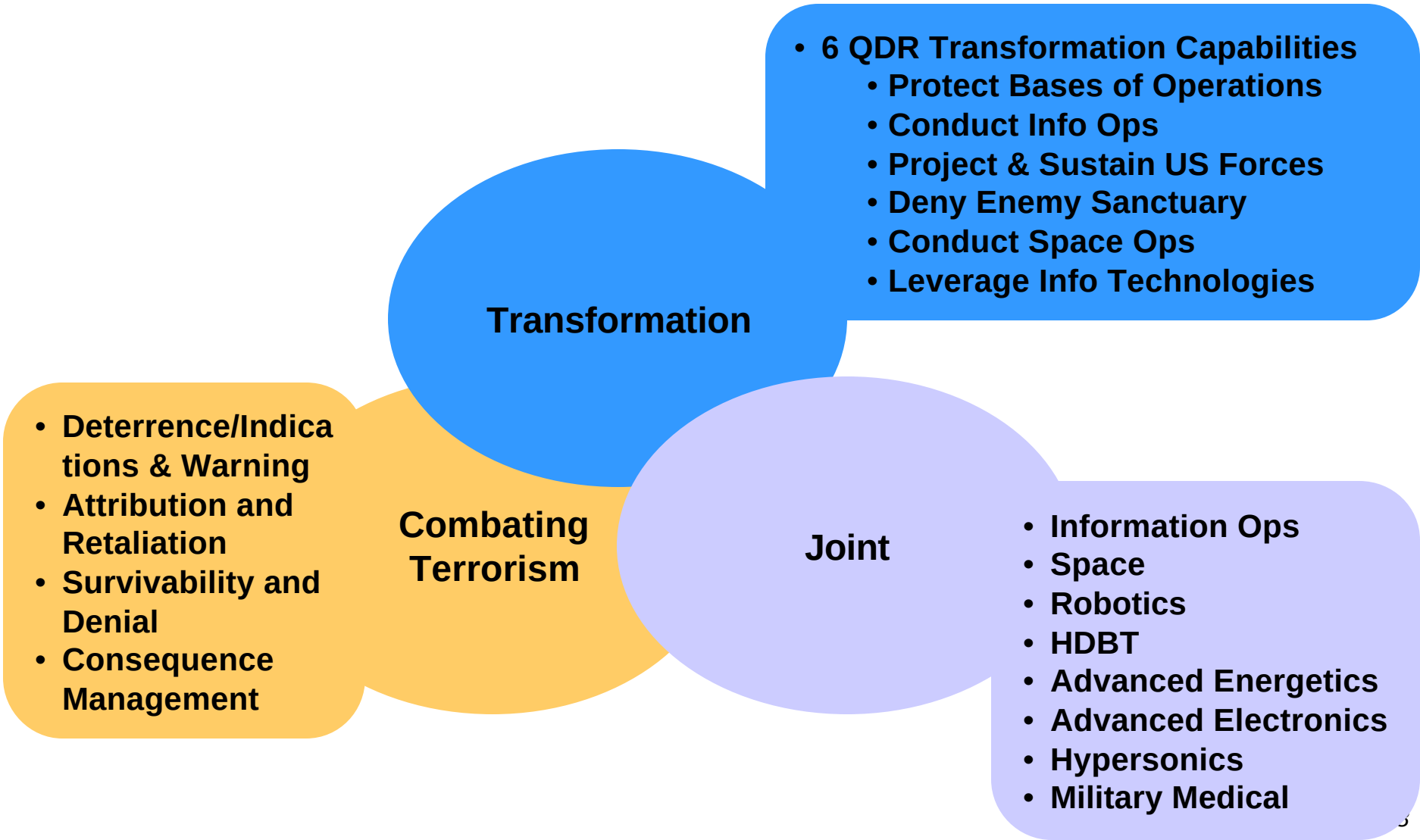
Hybrid/Electric Combat Vehicle

Electric/Hybrid Weapons



New Operational Capabilities

Science & Technology (S&T) Emphasis Areas



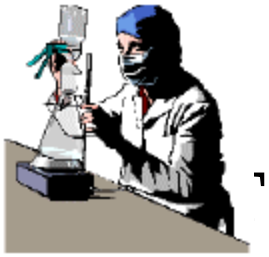
Technology Transition and Interoperability

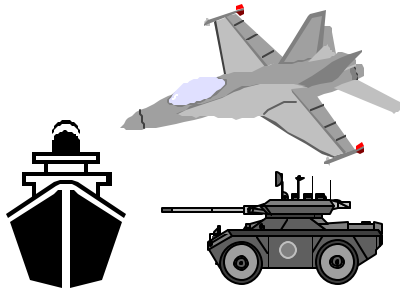
- **S&T Investment Aligned With DoD Goals**
  - **Transformation, Combating Terrorism, and "Jointness"**
  - **Strong S&T Base is Critical for Rapid Technology Transition**
- **Technology Transition Effort Has Many Facets**
- **Early Emphasis on Interoperability Facilitates Technology Transition**
  - **"Joint" Capabilities**
  - **Communications, Platforms, Common Manufacturing, Test, O&M, Logistics, etc.**

Best Practices

All Services are moving their acquisition processes

FROM





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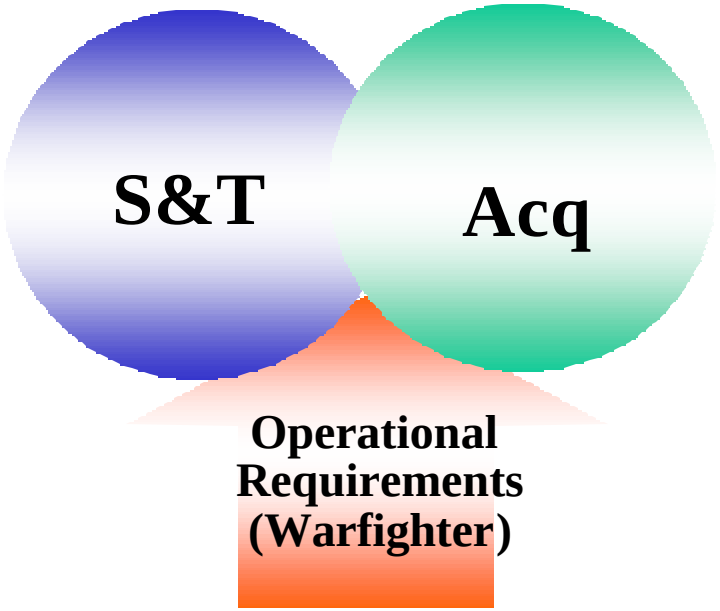
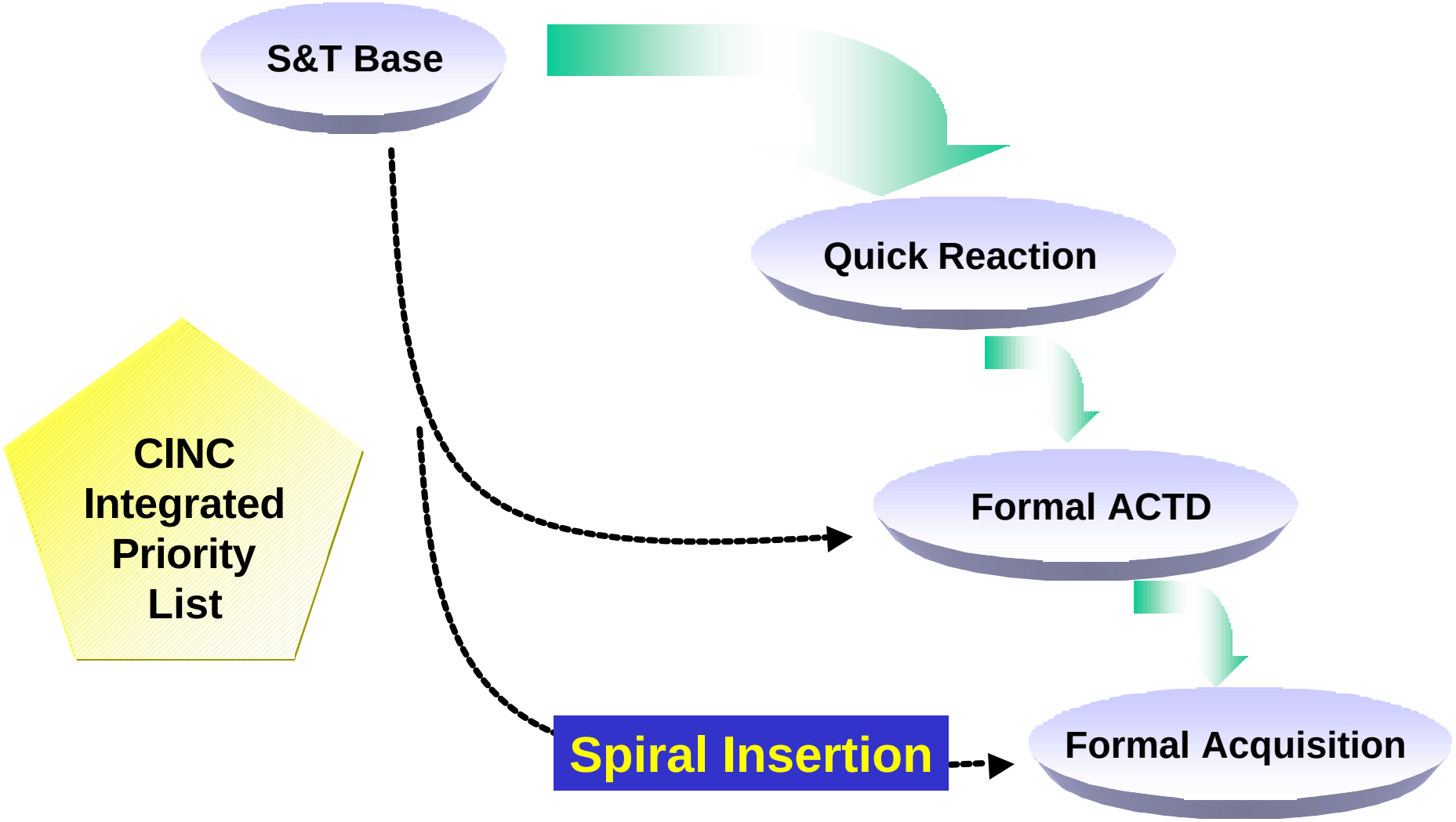


Right
- *Technology*
- *People*
- *Time*

Complimentary Transition Efforts



Thermobaric Weapons
Case Study In Rapid Technology Transition

- A “Quick Reaction” type development, enabled by base S&T program and ACTD Framework
- Chronology: Program Approved Sept 21, 2001
  - Small Quantity Lab Testing – Oct
  - Full Up Static Test – Nov 17
  - Flight Test - Dec 14
- Team: USN, DTRA, USAF, DOE

Chemistry → ***Weapon***

3 months

Predator
ACTD Technology Transition

- Developed as an Advanced Concept Technology Demonstration (ACTD)
- Successfully Demonstrated in Bosnia
- Rapid Progression From Demo to Operational Use
- First ACTD to Transition to the Operational Air Force
- Operating Command - ACC
- Sustainment - AFMC

Joint Strike Fighter
Formal Acquisition

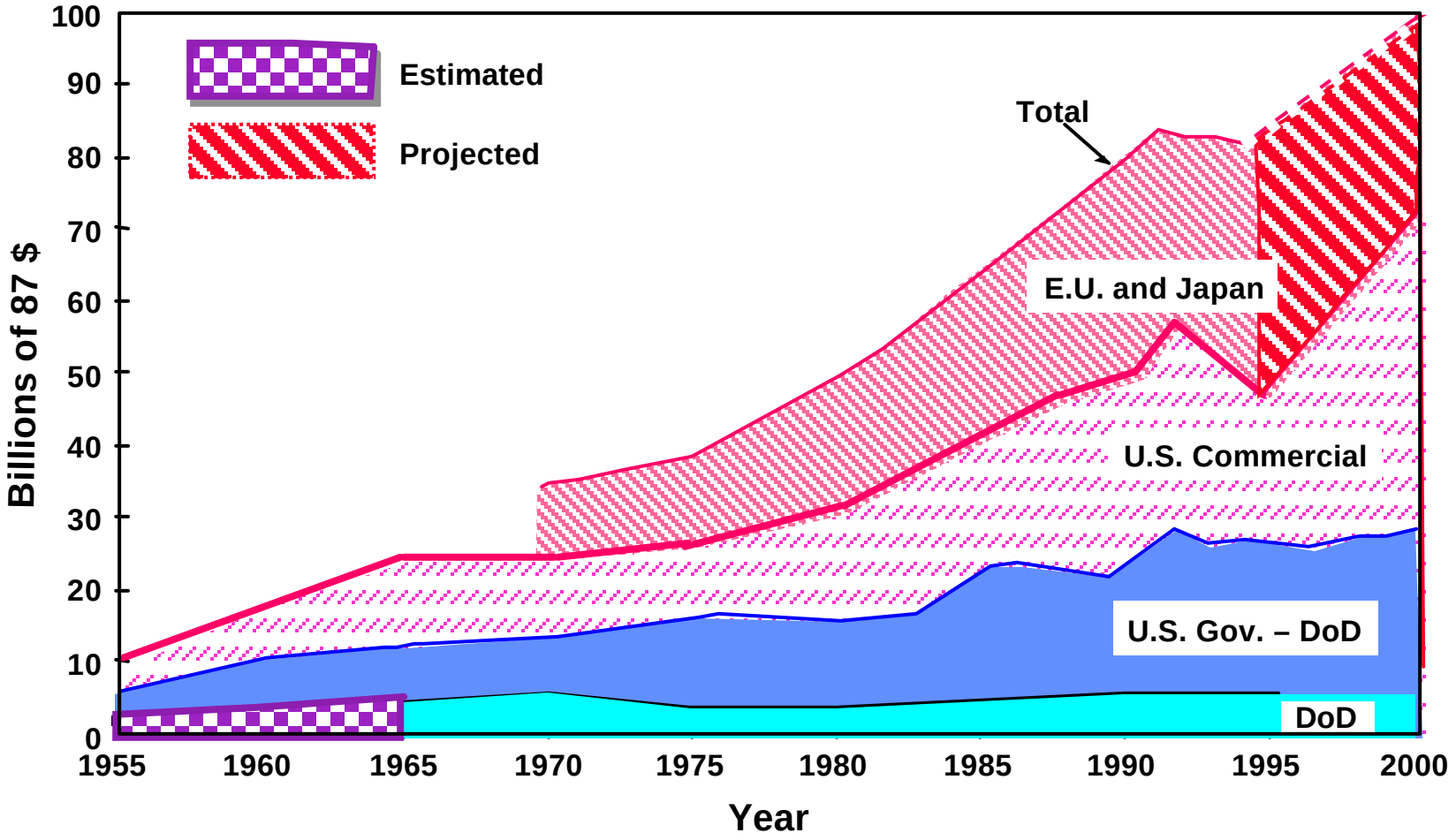
Technology Readiness Assessments (TRA) provide systematic review of technology maturity and readiness for transition

- **First Milestone B TRA Conducted On The Joint Strike Fighter**
- **Critical Technology Areas Were Assessed**
- **Focuses Technology Resources On Risk Mitigation Planning**
- **Commonality between Service Variants Addressed**

Bringing the Technology and Acquisition Community Together

Joint Direct Attack Munition (JDAM)
Example of Interoperability

U.S. and Worldwide Research Base Since WWII



Source: Report of the Defense Science Board Task Force on the Technology Capabilities of Non-DoD Providers; June 2000; Data provided by the Organization for Economic Cooperation and Development & National Science Foundation

Summary

- **Interoperability – A Key to Joint Warfighter**
- **Technology is the Foundation for Transformation**
- **Importance of Systems Engineering**
- **Accelerating Technology Transition is Critical**

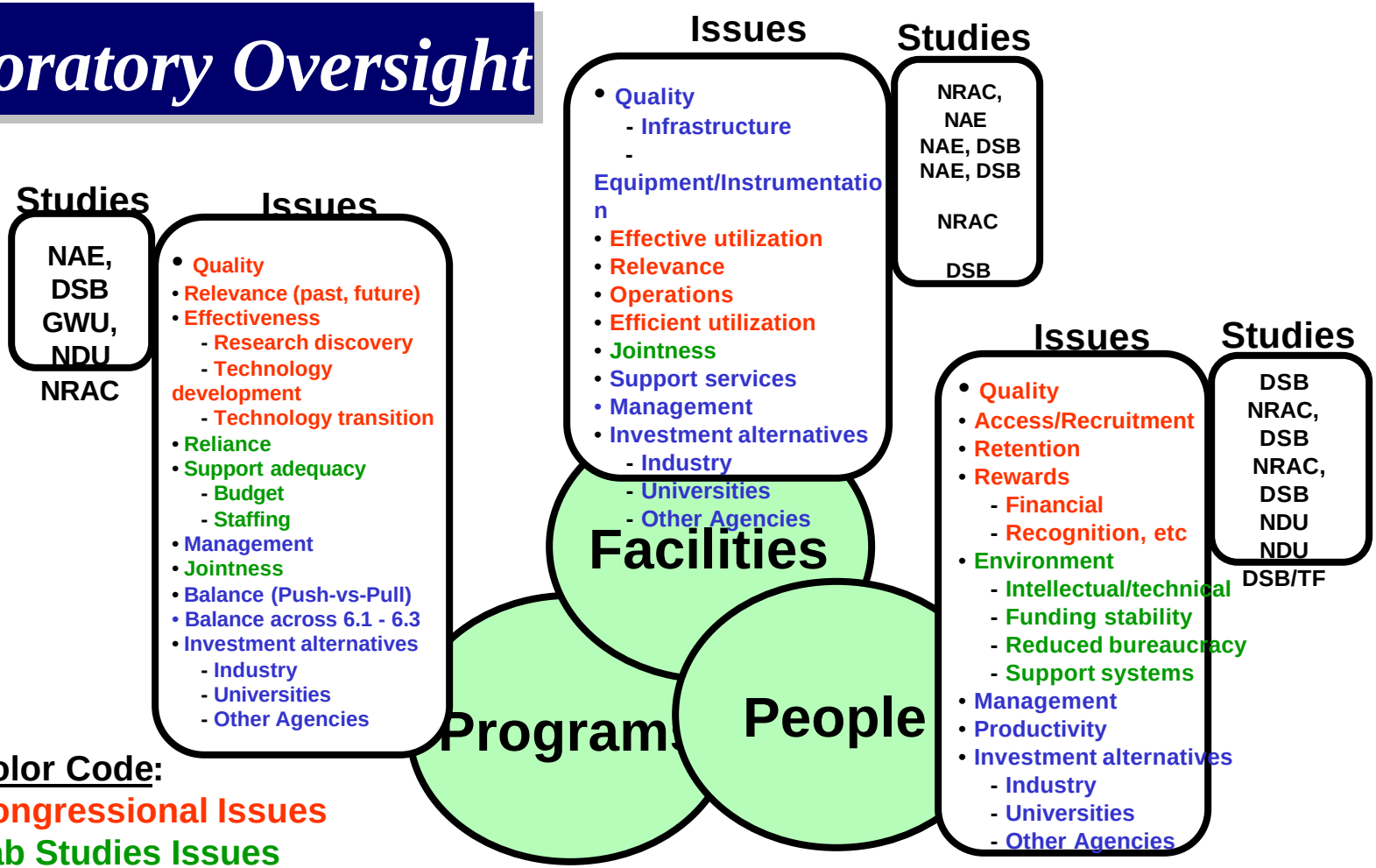
BACKUPS

National Security Workforce and Laboratories

- DoD Investment in University-based Research Increases the National Workforce in Critical Technology Areas
- Expanded Use of Workforce Pilot Programs Will Strengthen Labs
- Laboratories Supporting National Security Need to Modernize Infrastructure

Laboratories & People

"Laboratory Oversight



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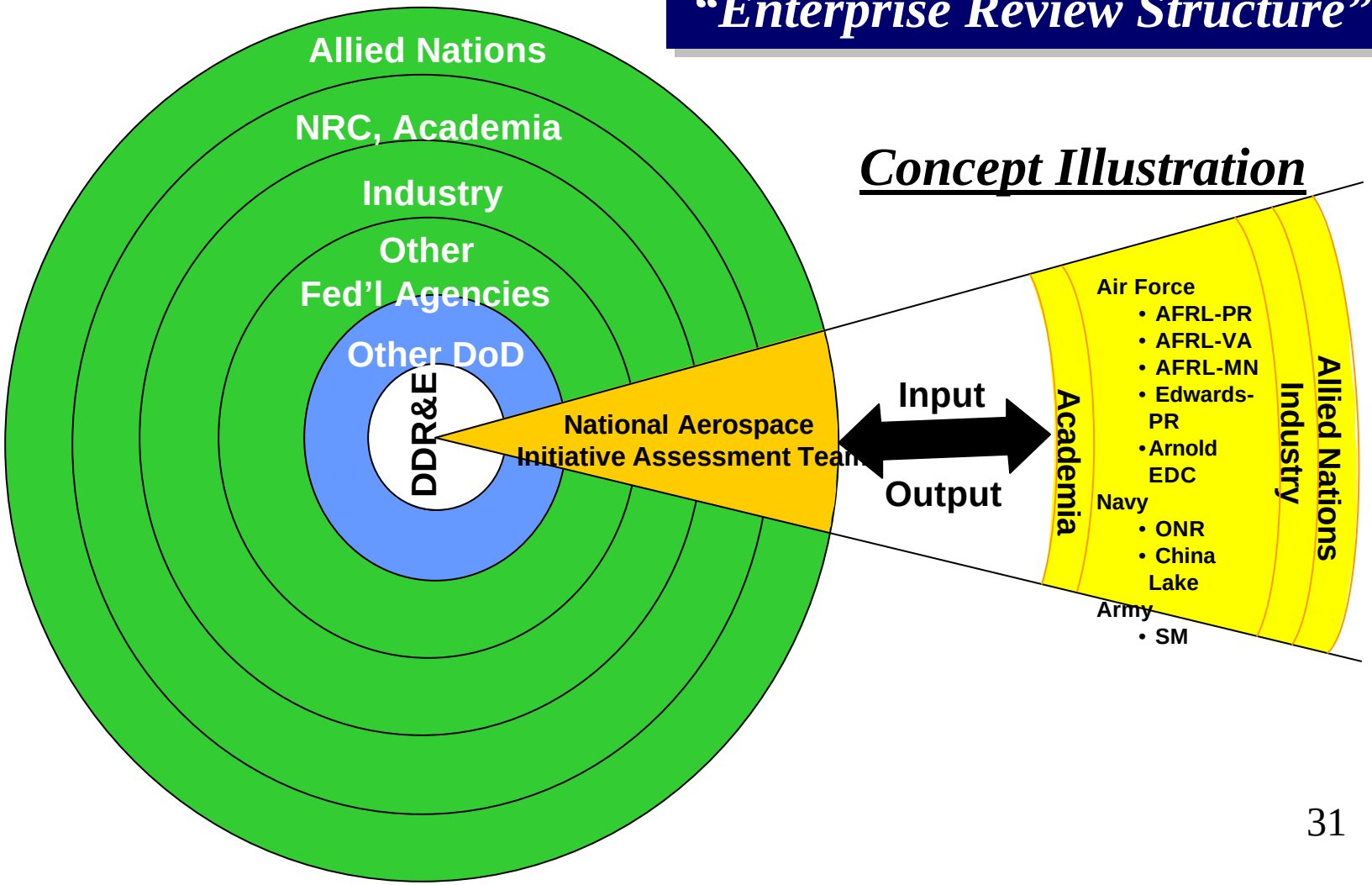
Congressional Issues

Lab Studies Issues

DDRE Oversight Issues

Laboratories & People

"Enterprise Review Structure"



DoD CTO Responsibilities

- **Principal Advisor to the "CEO" (SECDEF) for Technical Matters**
- **Responsibilities**
  - **Provides Oversight / Assessment of the "State of the Art" in militarily relevant technologies:**
  - **Leads Change of Development of New/Transformational capabilities**
  - **Assesses Application of Technology to Acquisition Programs**
  - **Shapes the DoD Laboratories and Workforce**
- **Mechanisms**
  - **Policy**
  - **Financial**